Sustainable Urban Rehabilitation in Europe

Construction Applied to Heritage

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Sustainable Urban Rehabilitation in Europe

3rd Semester

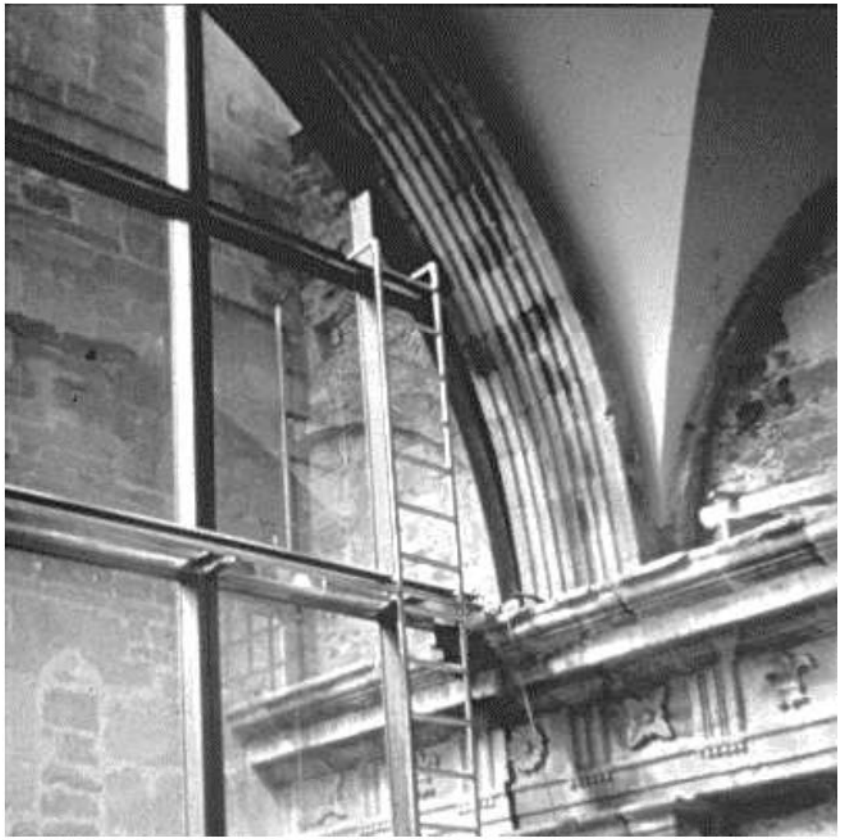
Susana Mora Alonso-Muñoyerro
Ignacio Mora Moreno
David E. García García
M. Carolina Hernández Martínez
Camila Burgos Vargas

Construction Applied to Heritage

3 ECTS

SH
Sustainable Heritage

EC
Elective Courses



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SURE
SUSTAINABLE URBAN REHABILITATION IN EUROPE

UNIVERSIDAD POLITÉCNICA DE MADRID

Sustainable Urban Rehabilitation in Europe

Construction Applied to Heritage

SH Sustainable Heritage

EC Elective Courses

1. Foundations.
2. **Retaining Works.**
3. Drainage and Sewerage Systems.
4. The Porous Loadbearing System.
5. The Porous Loadbearing System. Walls.
6. The Porous Loadbearing System. Grid Structures.
7. The Compact Loadbearing System.
8. The Porous and Mixed Horizontal Loadbearing System. Slabs.
9. The Porous and Mixed Horizontal Loadbearing System. Grid slabs.
10. Roofs.
11. Sloping Roofs.
12. Flat Roofs.
13. Façades. Porous System. Ventilated Façades.
14. Façades. The Compact System. Curtain Walls.
15. The Internal Partitioning Layout. Construction Process.

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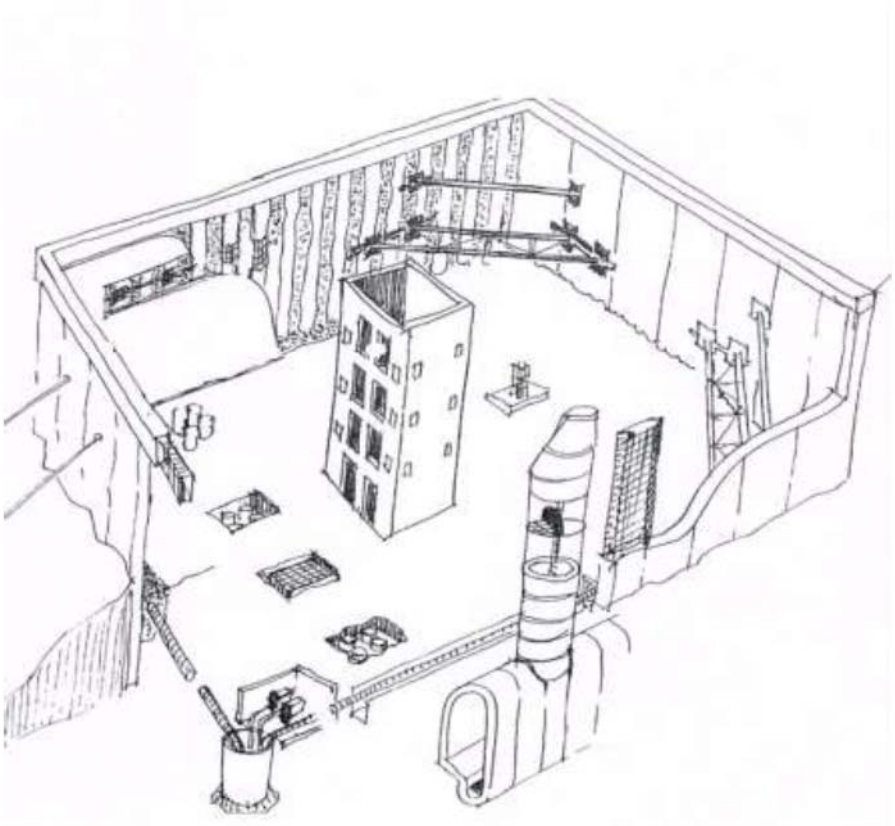

02RETAINING WORKS

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- Objectives
- Typology of retaining works:
  - Basement walls
  - Slurry walls
  - Piles screens
- Execution process. Quality control.

RETAINING WORKS

FUNCTION CONDITIONS

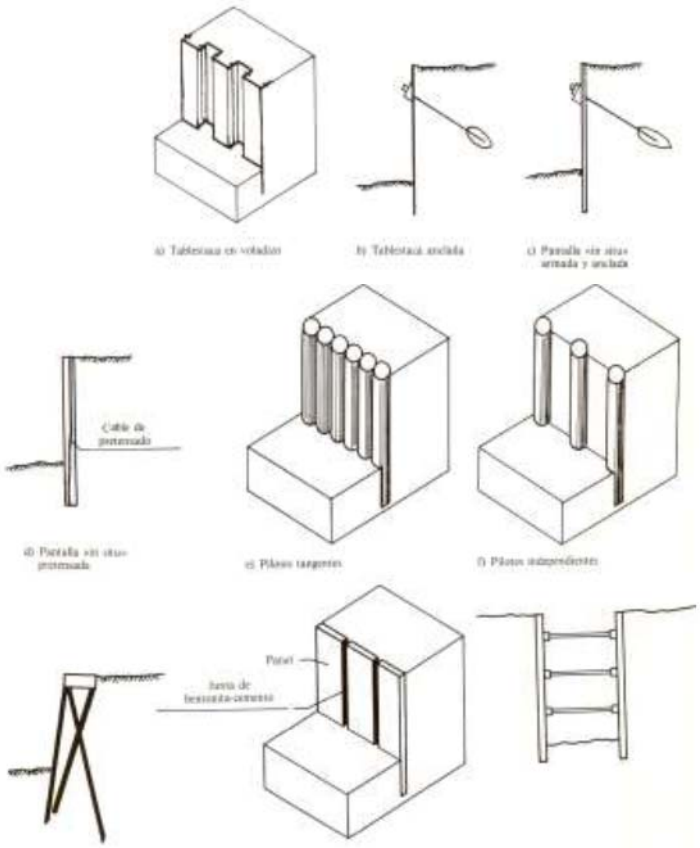
- MORPHOLOGY

- DEPTH OF THE FOUNDATION SOIL

- LOAD-BEARING WALLS have a basically supporting function. They receive vertical loads from other elements of the building.

- BRACING OR RIGIDITY WALLS, basically, have a stabilising function. They brace the horizontal loads from other walls or structural elements.

- RETAINING WALLS have a double function: as load-bearing wall and bracing wall. They suppport vertical loads from gravity and horizontal loads from earth pressure.



STRUCTURAL RETAINING WALLS

BASEMENT WALLS

PERMANENT EARTH CONTENTION

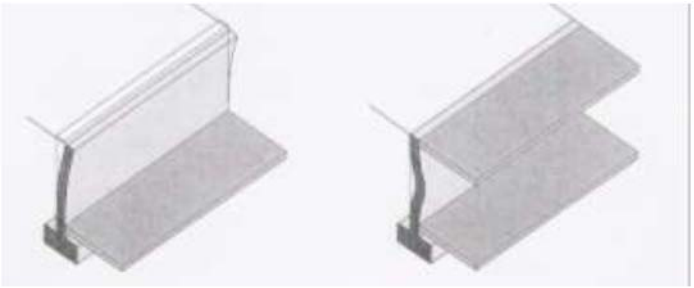
- Walls
  - General characteristics
    - Medium changes in level
    - Massive elements
    - Always executed after the excavation has been carried out
  - Classification
    - According to work conditions
    - According to construction material
    - According to execution system

- Slurry walls

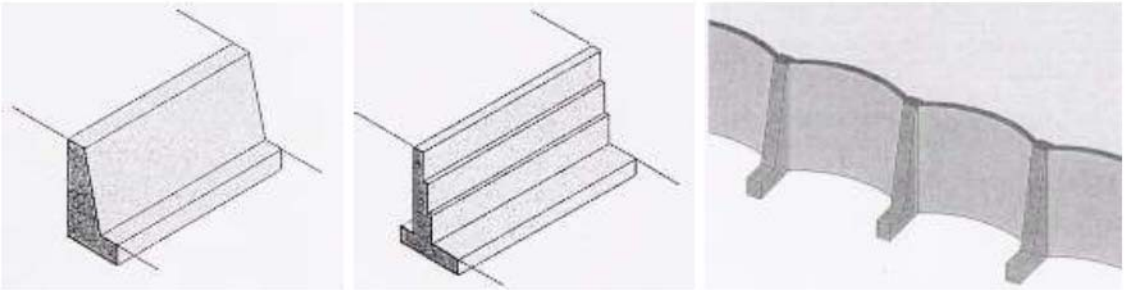
BASEMENT WALLS

According to working strategy

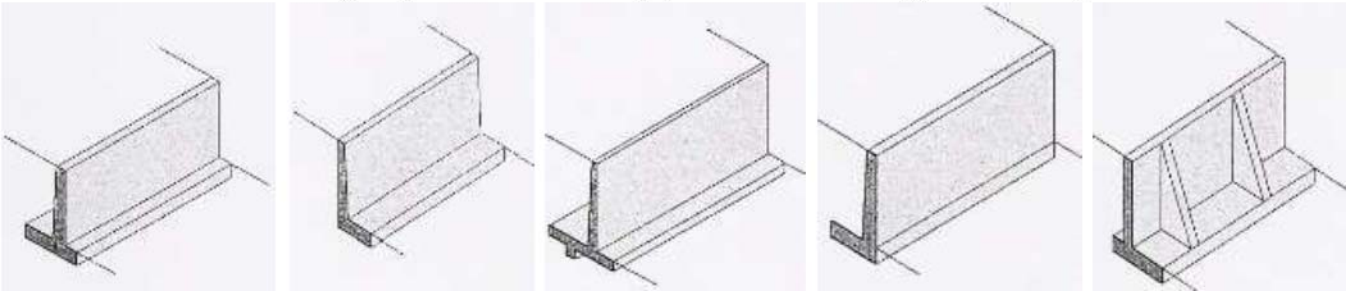
MECHANICAL ASPECTS



WORKING ON GRAVITY



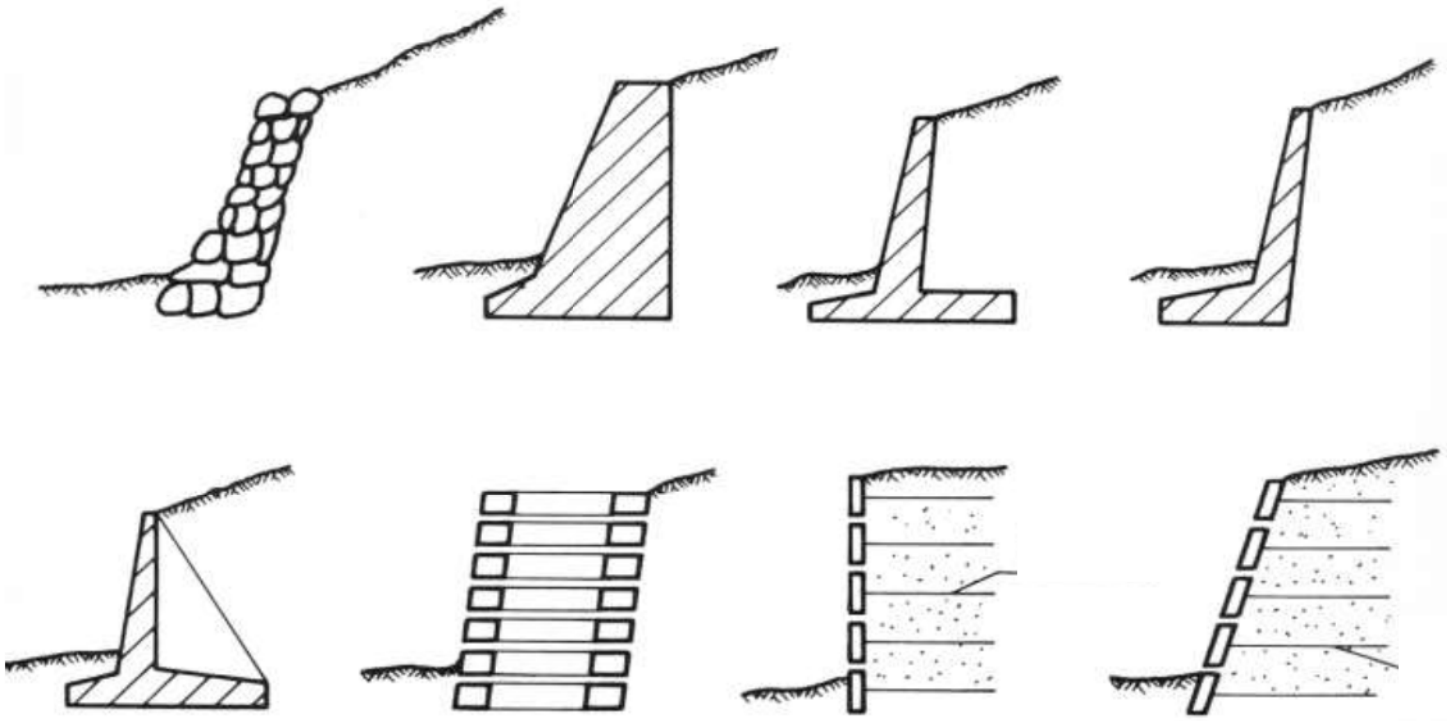
REINFORCED (capable to support bending stress)



BASEMENT WALLS

According to working strategy

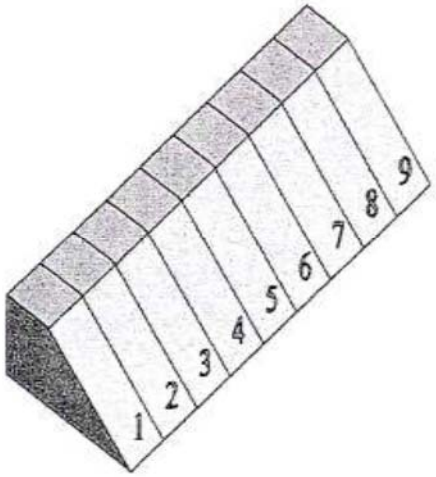
- Stone work: ashlars or rubbles.
- Brick work.
- Massive concrete.
- Reinforced concrete.
- Reinforced earth.

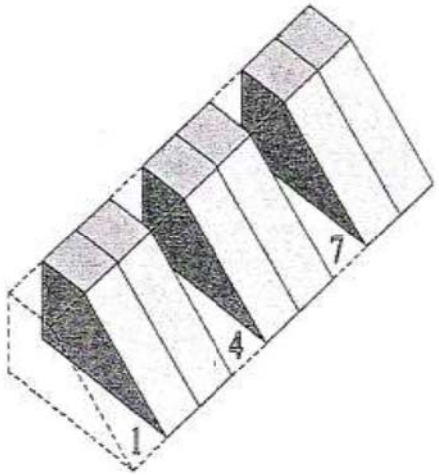


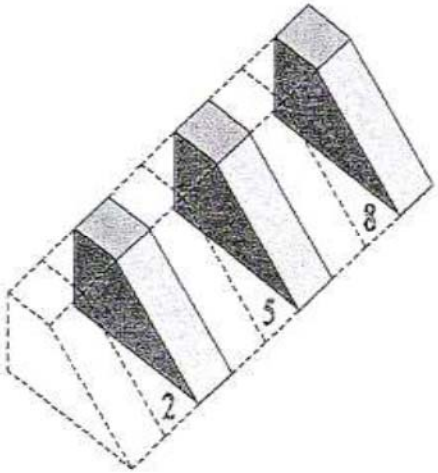
BASEMENT WALLS

PLACEMENT OF THE REINFORCEMENT

- BY TRENCHES

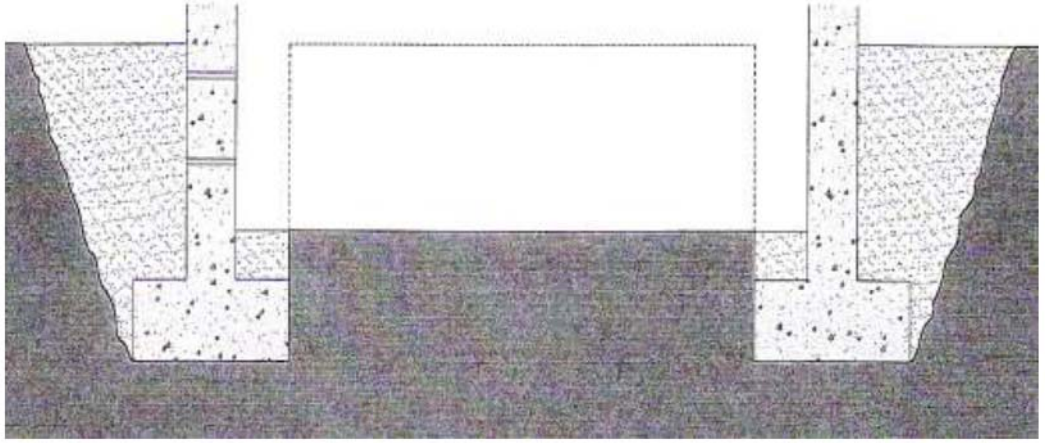




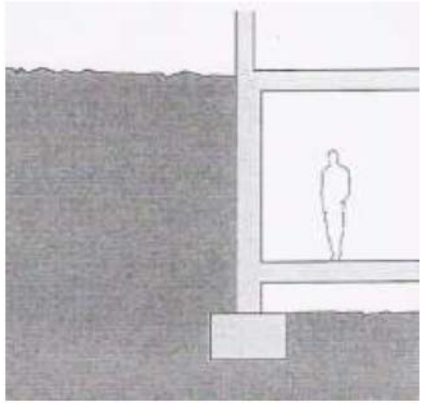


BASEMENT WALLS

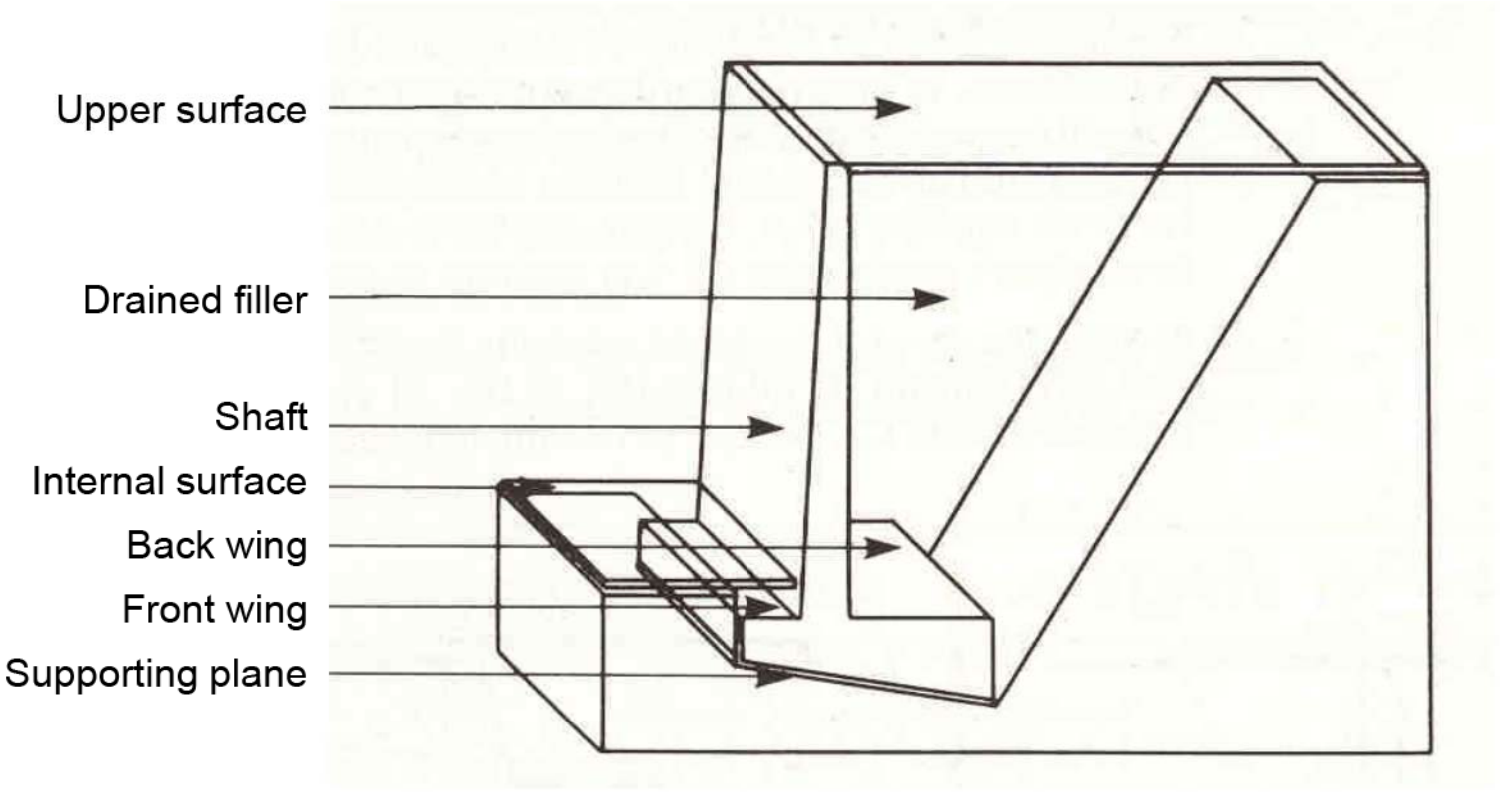
ON A LEVELING PROCESS
(Double side formwork).



IN BASEMENTS
(Formwork on one face).

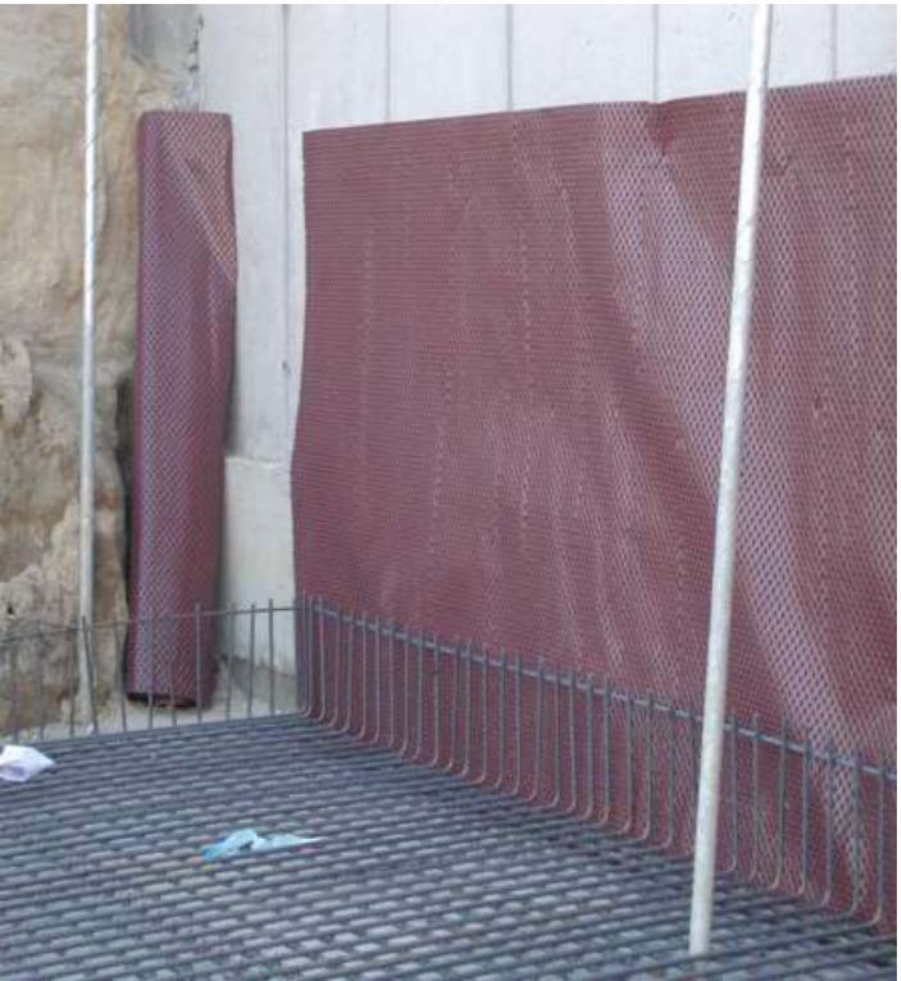


ON-SITE RETAINING WALLS WITH TILTED BASE

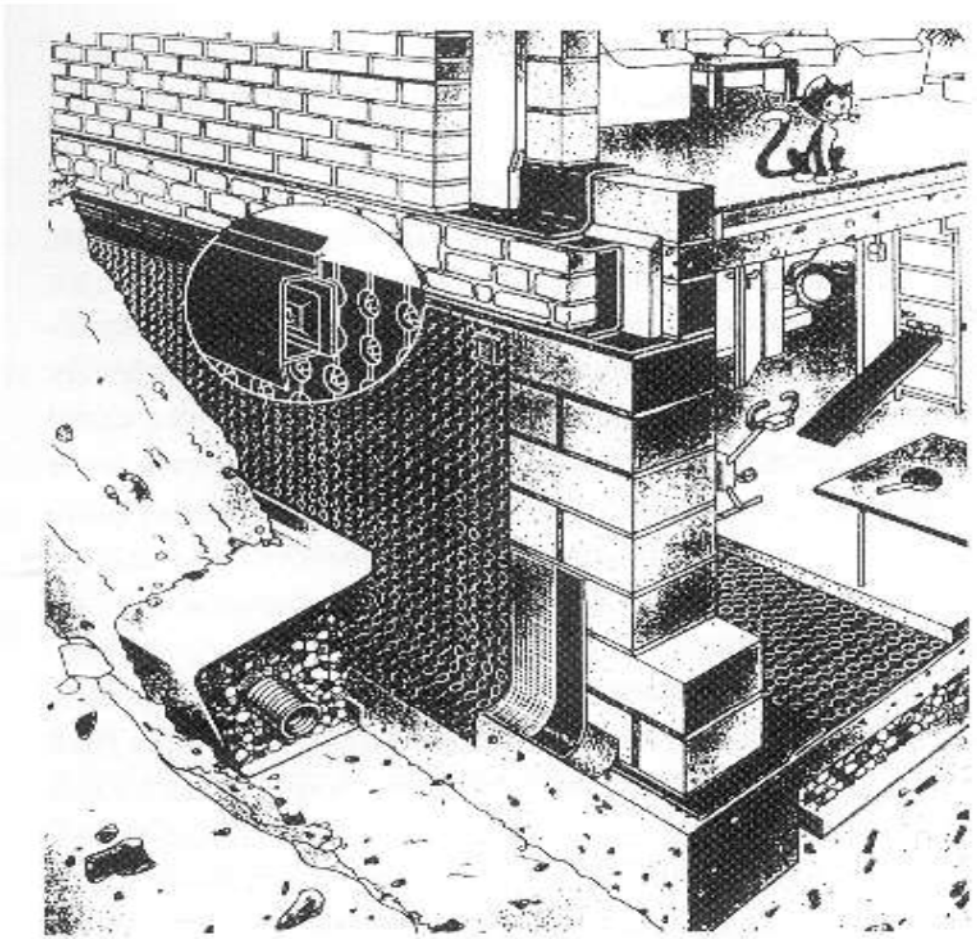


BASEMENT WALLS

Internal face.



External face.



DIAPHRAGM OR SLURRY WALLS

GENERAL CHARACTERISTICS

- Used when there is a medium-high difference of earth levels.
- Always executed before carrying out the excavation.
- They are slender elements.
- They can serve as a retaining wall and perimeter foundation as well.

MECANICAL ASPECTS

- They resist only flexion stress.

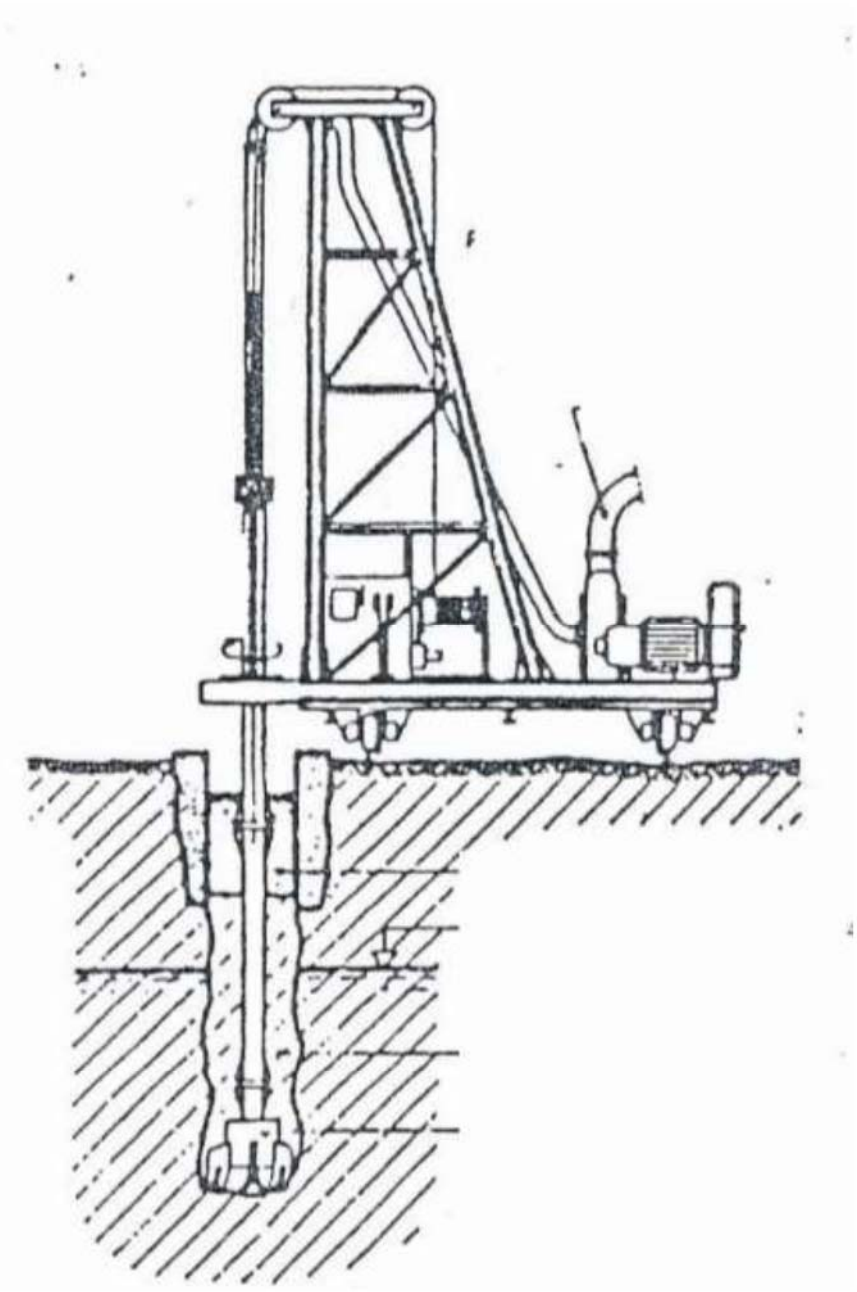
CLASSIFICATION

- According to the mechanical performance:
  - Fixed or built-in.
  - Supported.
- According to the execution system:
  - Continuous.
    - Executed in tranches
    - Composed by panels
  - Discontinuous.
    - Piles screens

DIAPHRAGM OR SLURRY WALLS

EXECUTION PROCESS

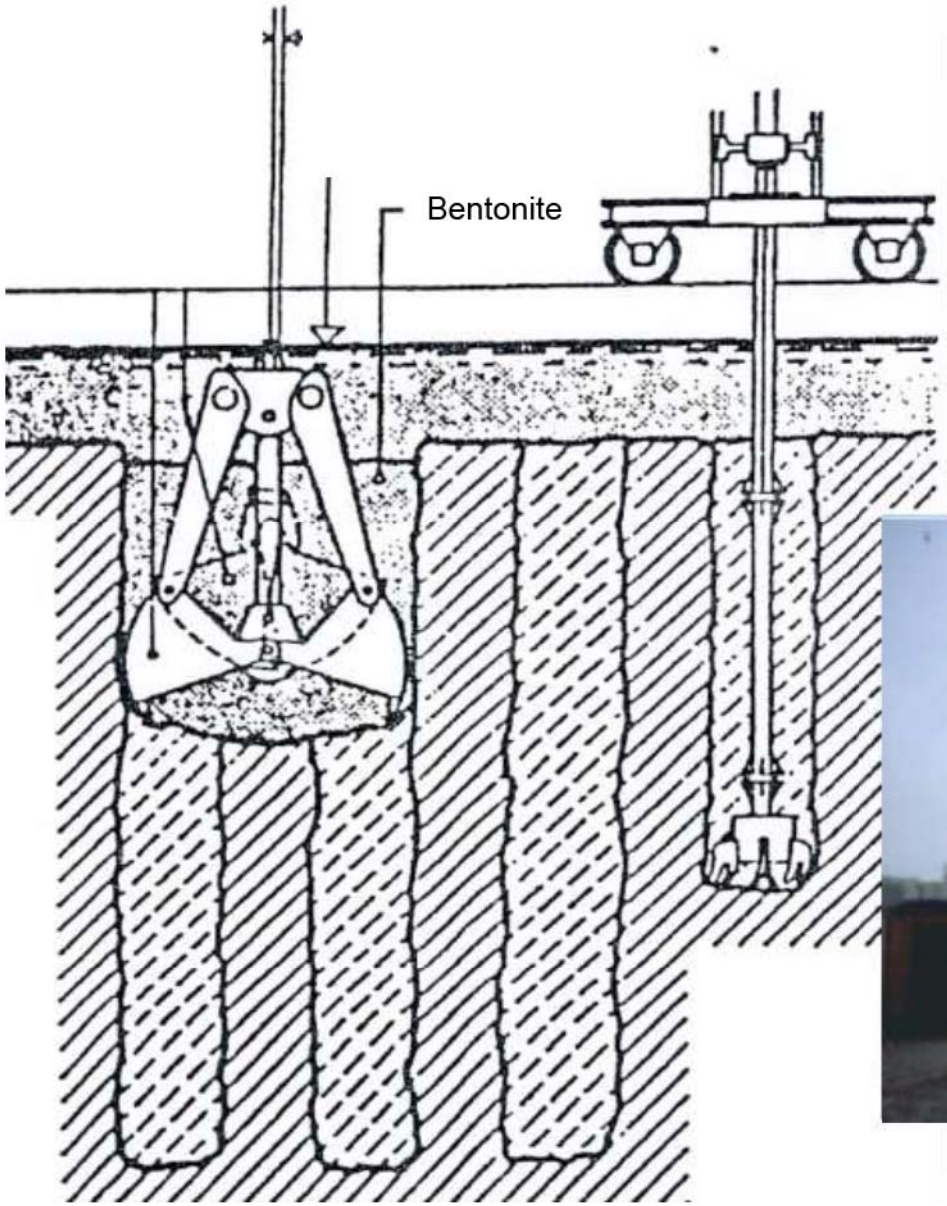
- GUIDE WALLS
- TRENCH EXCAVATION. EXECUTION IN PANES
- EARTH RETAINING
- JOINTS

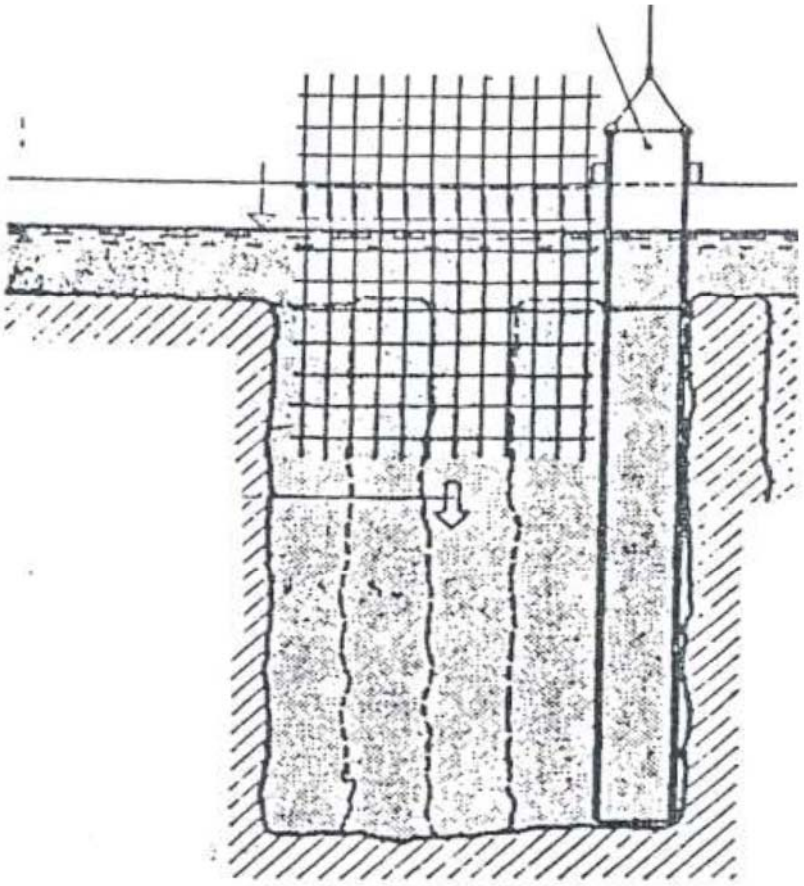


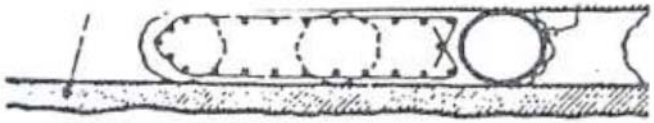
SLURRY WALL

EXECUTION PROCESS

A deep trench excavation is executed using a clamshell or grab suspended by cables to a crane. The grab can easily cut through soft ground.


Bentonite



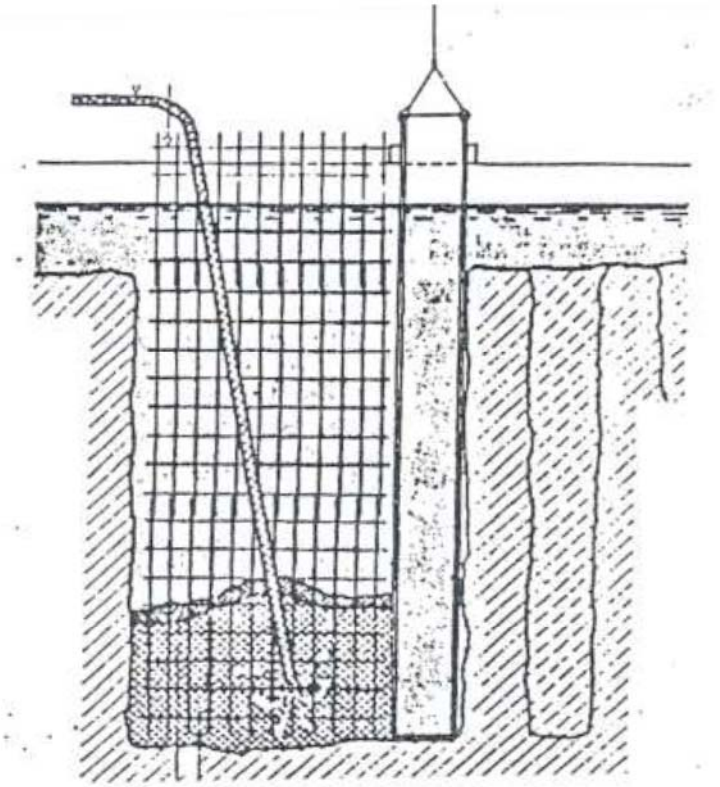


SLURRY WALL

EXECUTION PROCESS

Steel reinforcement is inserted in the form of a steel cage.

Overlapping or different sections to reach the full length may be required.

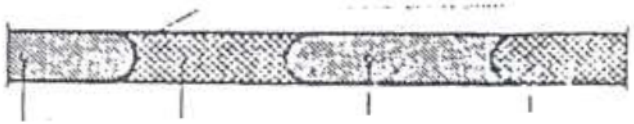


SLURRY WALL

EXECUTION PROCESS

Concreting using tremie pipes to avoid the segregation of concrete. As concrete is being poured down, bentonite will be displaced due to its lower density. Bentonite is then collected and reused.

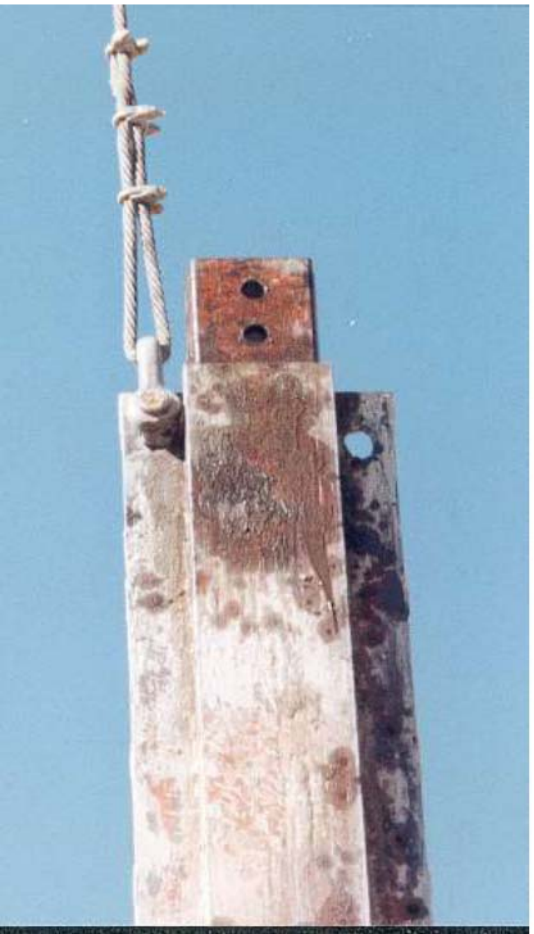
Execution by trenches



SLURRY WALL

SLURRY WALL

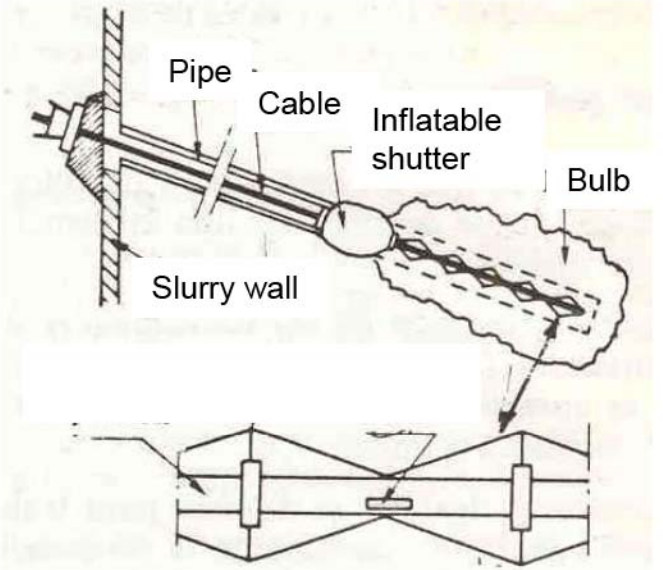
JOINTS



SLURRY WALL

REINFORCEMENT

SLURRY WALL ANCHORAGES



PILES FOUNDED SCREEN

- ATTACHED PILES
- SEPARATED PILES

Upper tie beam

Separated piles



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